to render all possible aid in collecting and forwarding medical publications that may be left with county medical society officers, or with hospital staff executives.

"If it is not convenient for you to place with, or forward to the University of California, Stanford or Los Angeles County Medical Libraries, journals that have been collected, the same may be forwarded, via 'Railway Express Agency,' *collect,* addressed to the C.M.A. Postgraduate Committee, Room 2004, 450 Sutter, San Francisco. The Committee will then be happy to carry on from that point, as regards distribution to suitable military hospital stations.

"Perusal of the editorial comment on this subject in the September issue of CALIFORNIA AND WESTERN MEDICINE will acquaint you with details of the plan. This letter is written to bring home to you the importance and urgency of early *coöperation.*

"The hope is also expressed that an attempt will be made by your respective officers, or a special volunteer or other committee appointed for the task, to *carry on this work from month to month,* so that the supply of medical literature may regularly go forward.

"Thanking you for your coöperation,

"THE CALIFORNIA MEDICAL ASSOCIATION
COMMITTEE OF POSTGRADUATE ACTIVITIES."

"The addresses of the three libraries follow:

U. C. Medical Library, the Medical Center, Third and Parnassus, San Francisco, California.

Lane Medical Library, Clay and Webster Streets, San Francisco, California (Stanford).

Los Angeles County Medical Library, 634 South Westlake, Los Angeles, California.

If more convenient, you can send journals, via 'Railway Express Agency,' *collect,* to: C.M.A. Postgraduate Committee, Room 2004, 450 Sutter Street, San Francisco, California."

No apology is made for emphasizing again this plan of a procedure of service that will be sure of appreciation by physicians who are already in the armed forces. Their needs and their contentment, if we can somewhat aid in supplying such, should be ample compensation for those of us who are still at home.

Lend a hand!

EDITORIAL COMMENT†

ANAEROBIC BACTERIA IN PYORRHEA ALVEOLARIS

An important contribution to the bacteriology of suppurative periodontitis is currently reported by Hemmens and Harrison[1] of the Department of Bacteriology, University of Chicago.

During the opening decade of the present century dentists almost invariably assumed that "alveolar pyorrhea" is a single clinical entity with one specific microbic cause. Bacteriologists of that period, however, were unable to confirm this belief. Goadby,[2] for example, who studied smears and aerobic cultures from 100 cases, was unable to associate the disease with any one bacterial type. On the basis of opsonic tests he concluded that periodontitis is a non-specific infection with normal mouth bacteria, due to an insufficient production of specific antibodies. Bertrand and Valodier[3] postulated a nutritional deficiency as the underlying cause of this inadequate antibody production. On the basis of these theories a large number of dentists employed autogenous vaccines or vaccines made from normal mouth flora, but with disappointing results.

On account of this failure, the theory of immunological deficiency was quite generally discredited, and renewed attempts were made to find the presumptive specific etiological factor. Among the organisms emphasized by most investigators have been staphylococci, either acting alone or in association with streptococci, or with fusospirochetes. Amebas acting in symbiosis with normal mouth bacteria led to the hope that emetin might be a specific cure. It was later evident,[4] however, that these protozoa lack invasive power, are never found in living periodontal tissues, and probably act merely as non-pathogenic scavengers.

More recent investigators have called attention to the incompleteness of the experimental evidence thus far accumulated. Almost all of the earlier investigators limited their tests to the simpler aerobic techniques, leaving a large group of anaerobic microörganisms not yet adequately investigated. Hemmens and Harrison attempted to supply these missing data. They made parallel study of the anaerobic flora of healthy gingival crevices and suppurating periodontal pockets, with tests of pathogenicity by animal inoculations.

Eight different groups of obligate or facultative anaerobes were isolated from both exudates and normal gingival surfaces. The two floras differed only quantitatively from each other. Thus spirochetes were readily demonstrated in 100 per cent of all exudates, but in only 61 per cent of the normal cases. M. gazogenes was more often present on normal surfaces than in pus pockets. Fusiformus nucleatus was found in equal number in both cases. The conclusion was drawn that the anaerobic flora of the pus pocket is the same as that of the normal gingivae, there being quantitative difference in the relative percentages in the mixed flora. Inoculation of mice with pure cultures of these microörganisms or pure culture inoculation beneath the gingival mucosa of normal monkeys gave no evidence of individual pathogenicity. Even in monkeys suffering from "vitamin M deficiency,"[5] only a transient gingival inflammation was produced, which healed in about 4 days. No differences were demonstrable between the normal and suppurative floras by specific agglutination tests.

Since no one anaerobic species seemed to be the specific etiological factor it seemed probable that a symbiotic relationship existed that might be the essential pathogenic factor. Such associations are well known in other diseases, such as in Vincent's angina[6] and lung abscess.[7] In order to test this possibility periodontal pus diluted with broth or ascitic fluid was injected subcutaneously, intratesticularly, intraperitoneally, or intranasally into normal rabbits or mice. Small well localized abscesses developed in a few of these animals,

† This department of CALIFORNIA AND WESTERN MEDICINE presents editorial comments by contributing members on items of medical progress, science and practice, and on topics from recent medical books or journals. An invitation is extended to all members of the California Medical Association to submit brief editorial discussions suitable for publication in this department. No presentation should be over five hundred words in length.

which however usually healed completely within one week to 10 days. Attempts to infect a second animal from these temporary abscesses, however, were unsuccessful.

Since normal animals were thus relatively resistant to the mixed flora of periodontal exudate, scorbutic guinea pigs were then tested. These vitamin C deficient animals died within 10 days to two weeks of a progressive infection, usually including invasion of the blood stream. By inoculating normal guinea pigs with exudates from those scorbutic animals an infection was produced that was capable of indefinite serial passage in normal guinea pigs or rabbits. The mixed periodontal flora in these passage animals was characterized by a progressive increase in virulence accompanied by a decreased complexity. Of the 16 different organisms present in the initial alveolar pus, only 11 organisms were recovered from the first generation in scorbutic animals, and but 8 bacterial species after 7 subsequent serial passages in normal animals. After this passage a stable symbiotic mixture was established.

Subcutaneous inoculation of guinea pigs with this stable mixture produced an acute infection characterized by extreme prostration and death within 48 hours. The phlegmon spread rapidly over the ventral surface of the animal, and usually involved most of the subcutaneous tissues of the chest and abdomen at the time of death. With gentle traction the muscles of the chest and abdomen could be pulled away, leaving ragged shreds of necrotic tissue. The accompanying visceral lesions usually consisted of swelling and hemorrhage into the adrenals and a slight pneumonic consolidation. The adrenal lesion suggests a toxin production by the symbiotic anaerobic flora, though the nature of this presumptive toxin has not yet been determined.

In order to determine whether or not the normal gingival flora is capable of producing the same pathologic picture, similar passage was attempted with material from the mouths of 2 persons having normal gingivae. The infection in the initial scorbutic guinea pig was slower to develop than in previous tests with periodontal pus. After 7 subsequent serial transfers in normal animals, however, the virulence of the normal flora had been increased so that it now produced lesions similar to those produced by the stablizide mixed flora for periodontitis. The normal gingival flora, therefore, has a potential virulence equal to that of the mixed flora of periodontitis pus.

This finding renders it highly improbable that bacterial invasion is the primary cause of suppurative periodontitis. It seems probable that local and systemic conditions, such as unfavorable mechanical relationships supplemented by vitamin deficiency, cause a primarly breakdown of normal periodontal tissue with "pocket" formation. The normal gingival flora gaining admission to this "pocket" presumably acquires a sufficient virulence (or synergic balance) to be able to invade the adjacent healthy tissues and thus produce the terminal suppurative phase of the disease. Anaerobic bacteria, therefore, may be pictured as little more than secondary invaders, of relatively little importance from the prophylactic point of view. This is in line with the view already held by many periodontologists on the basis of clinical observation.

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RABIES EPIDEMIOLOGY AND CONTROL IN LOS ANGELES COUNTY*

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LOS ANGELES County has had an animal rabies problem for a long time, there having been only one year in the last fifteen when the incidence fell below 300 cases. Fortunately, the number of human cases have been few, though fairly recently five such cases occurred within a period of two years.

In May of 1941, a case of "furious" rabies occurred in which the problems of tracing contacts and controlling secondary cases presented so many characteristic features that the story is unusually interesting and instructive. The dog concerned was shot by a peace officer on May 16. The person on whose premises the animal was shot, fearing legal complications because it was wearing a collar and license tag, removed the collar and tag and buried the carcass shortly before word reached the Health Department of what had happened.

Prompt and judicious inquiry on the part of the local quarantine officer resulted in getting possession of the dog's head, collar and license tag, which made possible a confirmation of the diagnosis and enabled the dog's owner to be traced. From him it was learned that the dog had been given to him on May 10, and had run away from home on May 14 after fighting with several dogs in the neighborhood.

Knowing the place from which the dog started to run and the place where it was shot, a great

* From the Bureau of Preventable Diseases of the Los Angeles County Health Department and the Office of Communicable Disease Inspection.

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